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ACHIEVEMENT OF SCIENTIFIC LITERACY THROUGH INQUIRY BASED LEARNING IN SCIENCE

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Abstract

The aims of this paper is to cultivate students' science literacy through inquiry approach in learning. Science learning will be more meaningful for students if the student has a good ability scientific literacy, so that the learning needs of students as an attempt to form a human who has literacy science, the man who opened the sensitivity yourself, examine, filter, apply, as well as participate and contribute to the development of science and technology for improving the welfare of society. The multidimensional scientific literacy in the aspects of measurement that is in the content of science, scientific process, and application context.Subjects students should have the ability to use scientific knowledge, to identify questions and draw conclusions based on the evidence available in order to understand and make decisions to solve the problems. Efforts to achieve the subject of scientific literacy of students who have that emphasis on understanding the nature of science in learning. Science learning aims to master the concepts of science are applicable and meaningful for students, one of which can be done through inquiry-based science learning activities. Learning science using inquiry approach will help teachers link between the material taught with real-world situations and encourage students to make connections between their knowledge and its application in everyday life. Thus, this inquiry learning can improve students' scientific literacy and learning more meaningful for students.

Key words: Scientific literacy, inquiry based learning, science

INTRODUCTION

Science learning in schools is expected to be a vehicle for students to learn about themselves and the environment, and its application in everyday life. In the process of learning science can not be separated from the nature of science, one of which is a way of Investigating where students conduct an investigation to find a concept. In this investigation activities will bring science literacy skills that students apply concepts or facts obtained in school with natural phenomena that occur in everyday life. The ability of scientific literacy reflects the readiness of citizens in addressing global challenges is increasingly urgent. A society scientific literacy is one of the main goals of science education (Norris & Phillips, 2003). In literacy science emphasizes that students are able to understand the material science, master of science and use science process in the context of real life.

OECD PISA (Programme for International Student Assessment-Organization for Economic Cooperation and Development) has conducted a monitoring of the Indonesian State scientific literacy ability. The data obtained from the results of the PISA-OECD measurement known that the ability of learners in Indonesia in terms of scientific literacy as measured by the National PISA 2006 were still at a low level, ie 29% for content, 34% for the process, and 32% for the context, comparable the level of literacy in PISA International. From these findings,

especially for the context of the application of science proved that many learners in Indonesia can not associate scientific knowledge learned with phenomena found in everyday life.

Science education, seeking the formation of students as human subjects that have the capital literacy of science, the man who opened the sensitivity yourself, examine, filter, apply, as well as participate and contribute to the development of science and technology to improve the welfare and benefit of society. In addition to intellectual, scientific literacy also involves higher order thinking skills, social, and interdisciplinary. To realize the science literacy in science learning takes an approach to learning is inquiry.

DISCUSSION

The nature of science in the learning process

Natural Sciences related to the natural way of finding out about systematically, so that science is not only a mastery of knowledge in the form of a collection of facts, concepts, or principles, but also a process of discovery. Learning science is expected to become a vehicle for students to learn about themselves and the environment, as well as prospects for further development in applying it in everyday life. The learning process emphasizes providing direct experience to develop competencies in order to explore and understand the universe around scientifically.

Science is the study of natural phenomena. Science to answer basic questions such as what, why, how. The process of discovery answers to these questions can be answered through scientific method starts from the observation, formulating the problem, make hypotheses, hypothesis testing, data analysis, data interpretation, and conclusions. The process of discovery by a scientist conducted to find a truth which starts from the observation that the results obtained will be verified by others.

Sund & Trowbridge (1973: 2), the word science as "both a body of knowledge and a process". Science is defined as a building science and process. Furthermore, science has defined three key elements, namely attitude, process and product. Furthermore Koballa and Chiappetta (2010: 105), defines science as a way of thinking, a way of Investigating, a body of knowledge, and interaction with technology and society. Can be summarized that in science there is a dimensional way of thinking, a way of investigation, building science and its relation to technology and society. This has become a fundamental substance importance of learning science that develops the scientific process for the formation of the mindset of learners.

Learning science is an active learning to be done by the students is not something that is done to the students as suggested by the National Science Educational Standards (2003: 20) that "Learning science is an active process. Learning science is something the student to do, not something that is done to them ". Thus, in learning science students are required to learn actively implied in physical or mental activity, not only includes hands-on activities but also minds-on. In the process of learning science should be conducted in accordance with the nature of science. Knowledgeable in science learning (through core subject) is not enough, one of which must be equipped with the ability to conduct investigations.

An understanding of the nature of science (NOS) established as one of the characteristics expected for someone who has a scientific literacy (scientific literacy). People who literate in science in general should develop an understanding of concepts, principles, theories and processes of science and is aware of the complex relationship between science, technology and society and, more important is an understanding of NOS (Abd-El-Khalick & Bou Jaoude, 1997: 673) . In an effort to teach science to include the nature of science or NOS, learning strategies must be changed also that of the strategy that had been presenting science as a body of knowledge (body of knowledge) to present science as investigative activities and develop the ability to think. which generate knowledge about the universe solid (empirically based and internally consistent), but not perfect.

The knowledge gained through these activities is not just knowledge of the facts, but such facts are interpreted and this interpretation is highly dependent on the principles of inquiry used (Schwartz & Crawford, 2006). Therefore, without understanding the assumptions inherent in the NOS and the process of acquiring knowledge in accordance with the nature of science, the students may build the image of science that is only in the form of facts isolated and far from the context which can make the knowledge of relevant, valid and meaningful (Lederman , 1998). This means that science should be understood as a body of knowledge that is interpreted by grounding assumptions that affect the process and products of the business.

Literacy of science

According to the NRC (1996), a scientifically literate individual is able to experience the satisfaction of understanding the natural world; use scientific thinking in making personal decisions; participate intelligently in societal discussions on science and technology; and attain the skills and knowledge that are required for being productive in our current and future economy.

Each walk of life to contribute to technologically based on its level of understanding. In general scientific literacy has several components, these components are able to distinguish where the context of science and what is not science context, understand the parts of science and have a general understanding of the application of science, have the ability to apply scientific knowledge in problem solving, understand the characteristics of science and understand the context of a culture, know the benefits and risks posed by science.

Holbrook (2009) in the journal The meaning of science, stating scientific literacy means an award in science by improving the components of the self-learning in order to contribute to the social environment. Based upon scientific literacy has a broad sense, each circle can contribute in interpreting scientific literacy. Each walks of life to contribute to technologically based on its level of understanding. PISA scientific literacy is defined as the ability to use scientific knowledge, to identify questions, and draw conclusions based on the evidence, in order to understand and make decisions regarding the nature and the changes made to nature through human activity.

According to PISA scientific literacy is defined as "the capacity to use scientific knowledge, to identify questions and to draw evidence-based Conclusions in order to understand and help the make decisions about the natural world and the changes made to it through human activity" is defined science .Literacy as the ability to use scientific knowledge, to identify questions, and draw conclusions based on the evidence, in order to understand and make decisions regarding the nature and the changes made to nature through human activity. The definition of science is looking at literacy multidimensional scientific literacy, not only the understanding of scientific knowledge, but more than that. PISA also assesses students understanding of the characteristics of science as scientific inquiry, awareness of how science and technology shape the environment of material, intellectual and cultural, as well as the desire to engage in issues related - issues science, as a reflective man. Scientific literacy is considered a key learning outcomes in education at the age of 15 years for all students, whether or not to continue studying science after that.

National Teacher Association (1971) suggested that the literati of science is a person who uses scientific concepts, process skills, and values to make decisions everyday that he was in touch with other people or the environment, and understand the interrelationships between science, technology and society, including social and economic development. Knowledge that is usually associated with scientific literacy is 1) Understanding the natural sciences, norms and methods of science and scientific knowledge, 2) Understand the key scientific concepts, 3) Understand how the science and technology work together, 4) Respect and understand the

influence of science and technology in society, 5) Relationship competencies in the context of science, the ability to read, write and understand the system of human knowledge, 6) Apply some scientific knowledge and the ability to consider in everyday life (Thomas and Durant in Shwartz, 2005).

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There are important principles that must exist in a study that aims to training ability scientific literacy in students. principle-the principle is as follows: Creating a more conceptual learning, so that students are able to integrate concepts with everyday life. Once students understand the concepts, students are led in order to see the application of the concepts learned in everyday life. So that students are more motivated to learn, the teacher must be able to provide interactive learning. Create more conceptual learning, students are always exposed to the latest information and events that occur relating to the concepts learned. Create the topic has to do with social issues being discussed. Students are invited to understand topic in greater depth so that students really understand from concept to application of the subject in everyday life.

These five principles above are things that must exist in a minimum of a study that aims to increase scientific literacy. There are several models of learning that can be used in train scientific literacy abilities, one of them is inquiry-based learning.

Inquiry based learning to achievement literacy science

Inquiry implies as all student activities in which they build knowledge and understanding of the idea of science as practiced by scientists in discovering and building understanding (NRC, 1996). The National Science Teachers Association (NSTA) defines inquiry as a powerful way of understanding science content. Students learn how to ask questions and use the facts to answer these questions. In the process of inquiry learning, students learn to conduct an investigation and collect data from various sources, develop a description of the data, and communicate and determine conclusions.

Using science inquiry learning helps students put the problem into the right context, develop critical thinking skills, better engage students in learning, increase students' positive attitudes towards learning science, as well as improving communication skills. Broadly speaking, inquiry-based learning model has the important things in which each stage has a specific purpose, they are:

1. Brainstorming; aims to foster curiosity in students
2. Define the problem; aims to focus students on what you want to search
3. Formulate a temporary answer; aims to make students trained to formulate answers while
4. Predicting; aims to make the students design the proper way to test the transient response
5. Data collection; aims to train observation abilities in students
6. Process the data; aims to train data interpretation capabilities
7. Drawing conclusions; aims for students are trained how to make inferences from data obtained trends
8. Applications concept; students are able to look for relationships, applications, and make synthesis concepts learned in different situations.

Based on the stages of the inquiry learning that exist on the above, it can be conclude that inquiry learning is learning that is suitable if you want to training ability scientific literacy in students. stages of the existing on the science training capabilities are owned by scientists so indirectly this model can train ability high order thinking and literacy science.

The example of matter in science that achievement literacy science using inquiry based

learning.

Content Standards	Expected Performances
SCIENTIFIC INQUIRY ♦ Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena. **SCIENTIFIC LITERACY** ♦ Scientific literacy includes speaking, listening, presenting, interpreting, reading and writing about science. **SCIENTIFIC NUMERACY** ♦ Mathematics provides useful tools for the description, analysis and presentation of scientific data and ideas.	Make observations and ask questions about objects, organisms and the environment. Use senses and simple measuring tools to collect data. Make predictions based on observed patterns. Read, write, listen and speak about observations of the natural world. Seek information in books, magazines and pictures. Present information in words and drawings. Use standard tools to measure and describe physical properties such as weight, length and temperature. Use nonstandard measures to estimate and compare the sizes of objects. Count, order and sort objects by their properties. Represent information in bar graphs.

CONCLUTION AND SUGGESTION

There are important principles that must exist in a study that aims to training ability scientific literacy in students. principle-the principle is as follows: Creating a more conceptual learning, so that students are able to integrate concepts with everyday life. Once students understand the concepts, students are led in order to see the application of the concepts learned in everyday life. These five principles above are things that must exist in a minimum of a study that aims to increase scientific literacy. There are several models of learning that can be used in train scientific literacy abilities, one of them is inquiry-based learning.

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